



U.S. DEPARTMENT OF ENERGY

**ENERGY**

# Across The Pond

A Quarterly Update on Joint UK NDA/US DOE Activities and Initiatives

Issue **4**: Summer **2010**



## 1 DOE-NDA discuss Spent Fuel Shipments

*Meeting with Dounreay Site Restoration Ltd. on Gap (non-US origin) Material Shipment:*

Environmental Management (EM) supported a National Nuclear Security Administration (NNSA) led team on a visit to the Dounreay Site, near Thurso, Scotland on July 14-15, 2010.

The purpose of the visit was to meet with DSRL representatives on a potential Gap spent fuel (non U.S.-origin) shipment to the US at the Savannah River Site. The EM-HQ representatives included Yvette Collazo, Director for Technology Innovation and Development and Gary DeLeon, Director for Nuclear Materials Disposition.

*Gary said "This visit gave me the opportunity to see first hand the complexities involved with planning and logistics for shipping spent fuel back to the US. I was impressed with the level of cooperation, integration, and teamwork between NNSA, EM, and the Savannah River Site to support this important initiative for the Administration."*

The meeting with DSRL involved initial planning, logistics, schedules and contract requirements needed for the shipment to occur. The team also visited hot cell facilities where the spent fuel is currently being stored and performed visual inspections on some of the spent fuel to assess its integrity and condition. This potential shipment is part of the Administration's 4-year goal to accelerate nuclear material threat reductions efforts by the end of 2013 being managed by the NNSA Global



*Dounreay Site Restoration Ltd*

Threat Reduction Initiative Program. In support of this program, EM has responsibility for the receipt, storage, and eventual disposition of the spent fuel.

## 2 WIPP Program visit to NDA

On June 16th, Leif Erikson gave a presentation on the mission and vision of the US DOE to some 30 NDA staff involved in taking forward the UK's geological disposal programme. Leif is a consultant to Carlsbad Field Office (CBFO) and has more than ten years of active involvement in the Waste Isolation Pilot Plant (WIPP) repository in New Mexico, USA.

CBFO is responsible for the characterization, safe transportation and disposal of the US transuranic radioactive waste (TRUW), a waste category similar to the UK's long-lived intermediate level radioactive waste (ILW). The NDA's Radioactive Waste Management Directorate, has utilized information from WIPP to develop its

illustrative geological disposal concept for long-lived intermediate level waste in an evaporite host formation.

The CBFO's WIPP repository had operated safely for more than 11 years. Site characterization activities at the WIPP site commenced in 1973 and the two main objectives of the CBFO IRP are to:

1. Open the doors for the international radioactive waste management community to access available information.
2. Promote this process by having knowledgeable CBFO representatives serving on key international committees.

Gary Scott of CBFO will attend the next meeting of the International Association for Environmentally Safe Disposal of Radioactive Materials (EDRAM) which brings together the national waste management organisations of France, Germany,

Spain, Switzerland, the UK, Japan, the US, Canada, Belgium, Finland and Sweden.

### 3 Topic Area Update: Continued Progress Being Made

Topic Area Conference calls have continued through the last quarter with the primary focal points being D&D Technologies (sodium passivation and a UK-based demonstration of a DOE-funded decontamination approach), Spent Fuel Drying and Management and Hot Isostatic Pressing. The calls are generally attended by technical experts from the DOE and NDA as well as Site Contractors and National Lab personnel on both sides of the Atlantic. Some of the original Topic Areas (e.g. IX Resin Transportation and Disposal, Tank Corrosion and Structural Integrity) have now reached a conclusion and will be replaced with new areas such as Plutonium Management, Soils & Groundwater issues and Thermal Treatments.

Overall, the level of technical knowledge shared in these calls has been considerable and there is no doubt that both organizations have benefitted from the efforts to date. The following table provides a summary of the status of the Topic Areas.

### 4 DOE-NDA collaborations associated with the DOE EM-32 Groundwater and Soil Remediation Program

The DOE EM-32 Groundwater and Soil Remediation Program is focusing applied research efforts on the DOE complex-wide problem of metal and radionuclide contamination in highly diverse subsurface groundwater and soil environments. The aim is to develop and demonstrate technologies and approaches that result in protective and sustainable in situ remedial options, while also minimizing the need for more costly and hazardous excavation alternatives. There is applicability not only across the DOE Complex but, also internationally. Two such initiatives are:

1. Attenuation based remedies for metals and radionuclides in groundwater. Metals and long lived radionuclides, pose a great risk to the environment. Success is predicated on understanding the attenuation mechanisms and their effects on their mobility. The toxicity and stability of metals and radionuclides that remain

| Topic Area   | Topic Area Leads  |
|--|---|
| Fuel Drying  | Paul Gilchrist – NDA<br>Bill Hurt - INL<br>Hitesh Nigam – DOE HQ  |
| Glass Chemistry  | Gary Smith – DOE<br>Jim Marra – SRNL<br>Carl Steele – Sellafield Ltd                                    |
| Hot Isostatic Pressing                                   | Pramod Mallick – DOE<br>Ken Bateman - INL<br>Graham Jonsson – NDA<br>Mike James – Sellafield Ltd        |
| D&D Technologies   | John Inkester – NDA<br>Andy Szilagyi - DOE  |
| D&D Subtopic 1:<br>Sodium Passivation                    | Trevor Jones - NDA<br>Andy Szilagyi - DOE<br>Kirk Dooley - CWI  |
| D&D Subtopic 2:<br>Demonstration of<br>DOE Decon<br>Gel. | Mon Tindale - NDA<br>Andy Szilagyi – DOE<br>Paul Mort – Sellafield Ltd<br>Alex Jenkins – Sellafield Ltd |
| D&D Subtopic 3:<br>In situ<br>Entombment (ISD)           | Andy Szilagyi - DOE<br>John Gladden - SRNL  |

### Summary of key information discussed

- Significant information exchange completed.
  - Detailed technical exchange /lessons learned workshop scheduled 14th /16th September in Washington DC
  - Topic Areas to be discussed are:
    - Regulatory principles
    - Technology issues in fuel storage
    - International updates including Yucca Mountain discussion.
    - Commercial spent fuel storage experience.
  - Two joint projects have been identified:
    - Spinel Formation
    - Glass additives
  - SRNL and Sellafield Ltd have merged parts of their respective programs to eliminate duplicative work and reallocate the cost savings to additional scope.
- A visit of key Sellafield Ltd technical staff scheduled for 4-6 October to the INL active demonstration HIIP facility is being scheduled for September/October.
- Initial areas of collaboration identified:
    - Sodium passivation
    - In situ entombment
    - Demonstration of DOE decon technology at Sellafield.
  - Initial call identified a number of areas where the UK experience at Dounreay could have substantial benefit to the work being conducted at Idaho (e.g. long reach tooling).
  - Plans are being developed for a visit by CWI/DOE staff to Dounreay in the Fall.
  - Discussions are underway between NDA, Sellafield Ltd and DOE to identify suitable locations and projects for a small scale demonstration of the DOE-funded Decon Gel system.
  - Further discussions are planned to agree on funding and timing.
  - NDA has just begun to develop their plans for ISD.
  - Discussions to be scheduled in early Fall to facilitate a 'lessons learnt' exchange between NDA and the existing DOE/SRNL program.



in subsurface systems is determined by geochemical, biological and hydrological conditions and how these conditions change over distance and time. This initiative focuses on the “geochemical gradients” at contaminated sites and how the understanding and manipulation of these gradients provide unprecedented opportunities for cost effective, sustainable and protective attenuation based remedies. The technical framework supports development of the conceptual site model and selecting remediation technologies.

2. Advanced remediation methods for metals and radionuclides in the vadose zone. Functionally, the methods for addressing subsurface contamination must remove contamination and or reduce transport of contaminants through the vadose zone, and this problem is particularly challenging as vadose zone environments consist of complex stratified layers of unconsolidated and water unsaturated sediments that may be contaminated with radionuclides, metals, organics, and, in some cases, complex mixtures. If this results in contamination in the deep vadose zone and it disperses to associated groundwater, in situ remediation technologies or defensible technical data and justification for enhanced attenuation may be the only ways to perform effective remediation. This may provide the only viable paths to long-term stewardship of sites contaminated with metals and long lived radionuclides that is cost effective, effective and practical. The focus of this initiative is to develop in situ remediation technologies and defensible remediation strategies to transition sites from source and active treatments in the vadose zone to sustainable, more passive technologies. Two important areas of emphasis are:

- Minimally invasive delivery.
- Emplacement methods for

reagents and novel monitoring techniques for “deep” vadose zone environments.



*Diagonal Drilling at the F-Area Seepage Basin Savannah River Site*

## 5 DOE Fellows Program

The Department of Energy’s Office of Environmental Management (DOE-EM) oversees one of the largest environmental restoration projects in the world. DOE-EM’s labor statistics show that 91% of EM employees are 40 years old or older and only 1% of its workforce is under 30 years old. In addition, it is estimated that within the next three years, DOE-EM will lose as much as 30-35% of its technical workforce due to retirement. Likewise, a similar problem also affects other countries around the world such as the United Kingdom (UK). According to statistics provided by Whitmore et al, in the UK, 70% of the decommissioning sector workforce will retire by 2025, thus creating a gap in skilled workforce for the nuclear industry. This need in the UK translates to about 1,000 new recruits per year, mainly at the apprentice and college graduate level. At the same time, both countries are also experiencing a “renaissance” of the nuclear industry. Also the unfavorable public perception of nuclear power due to the Three Mile Island (1979) and Chernobyl (1986) accidents are becoming a thing of the past, and public confidence is building for nuclear energy.

In the United States (US), DOE-EM is responding to the aging workforce problem by proactively partnering with universities to train and develop the new generation of environmental restoration workers. In 2007, DOE-EM

and Florida International University’s Applied Research Center established the DOE-FIU Science and Technology Workforce Development Program. This is an innovative program designed to train and mentor students in STEM (science, technology, engineering, and math disciplines and provide them with career paths in the environmental restoration and nuclear industry. The selected students (called DOE Fellows) perform hands on environmental remediation research and participate in internships at DOE sites, national laboratories, and DOE contractors. Upon graduation and completion of the DOE fellowship, DOE Fellows pursue employment opportunities with DOE, and its contractors.

By the same token, many universities and institutes in the UK are also establishing programs and centers in an effort to prepare a new generation of scientists, engineers, and students that will be the future of UK’s nuclear industry. For example, the University of Manchester’s Dalton Nuclear Institute (DNI) was established in 2005 and acts as the engine to drive the coordination and growth of the university’s nuclear expertise.

FIU’s DOE Fellows Program and UK’s Dalton Nuclear Institute are examples of the UK and US efforts in building and retaining knowledge base for environmental remediation and nuclear industries. These programs are producing well trained young professionals that will fill a gap in the US and UK aging workforce and providing the platform to launch a 21st century workforce for the nuclear industry. Future work in support of the Bilateral Agreement between NDA and DOE may include discussions between FIU and DNI to share lessons learned and identify potential collaboration between the two institutions. Some of the potential collaboration efforts may include student exchange programs in order to expose students to markets in either side of the Atlantic. At an academic level, additional collaboration efforts may also include exchange of faculty and curriculum development and research exchange programs.

For further information please contact

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